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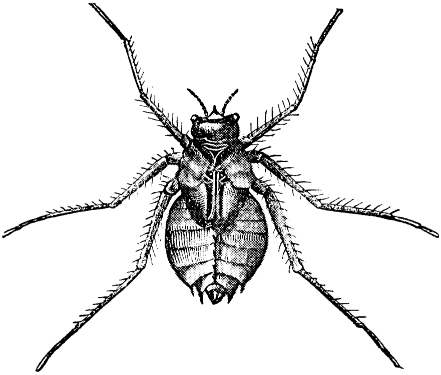
the *Callidium amœnum* Say (fig. 98). Its larva is represented by figure 81, *b*, upper, *c*, under side of the head.

One of the most wonderful cases of mimicry is that of a new span worm *Drepanodes juniperaria* Pack. (fig. 82 ; 83, larva and chrysalis) which can with difficulty be distinguished from the twigs of the juniper tree on which it feeds.

The cedar also has been found to be infested by a small Tinean, closely allied to the Apple Bucculatrix. This is described as the *B. thuiella* (fig. 84, enlarged; *a*, cocoon, nat. size). The transformations of *Telephorus bilineatus* Say (fig. 96 ; larva, enlarged, and adjoining fig. 97 showing *a*, upper, and *b*, under side of the head) are also described. The larva was identified by Mr. P. S. Sprague, who found it under stones in spring, where it changes to a pupa, and early in May becomes a beetle, when it eats the leaves of the birch.

Fig. 99.



Larva of Didymops?

Among beneficial insects are mentioned the ground beetle, *Galerita Janus* Fabr. (fig. 95) whose singular larva (fig. 94, *a*, upper, *b*, under, side of the head), was discovered by Mr. J. H. Emerton under stones early in July. The larvæ of two dragon flies, *Cordulia lateralis* (fig. 93) and a species of Didymops? (fig. 99) are also noticed.

NATURAL HISTORY MISCELLANY.

BOTANY.

The Number of Plants and Animals.—The days of a Systema Naturæ, or single work containing a synopsis of the genera and species of organized beings, are long since passed away.

Even a Species Plantarum, now that their number at the lowest estimate exceeds one hundred thousand, has become almost hopeless. The last attempt, De Candolle's Prodromus, has been nearly forty years in progress, the first portion has become quite out of date, and all we can hope for is that it may be shortly completed for one of the three great classes of plants. Animals might have been more manageable were it not for the insects. Mammalia estimated at between two and three thousand living species, birds at about ten thousand, reptiles and amphibia under two thousand, fishes at about ten thousand, crustacea and arachnida rather above ten thousand, malacozoa about twenty thousand, vermes, actinozoa, and amorphozoa under six thousand, would each by themselves not impose too heavy a tax on the naturalist experienced in that special branch who should undertake a scientific classification and diagnosis of all known species. In one important branch, indeed, the fishes, this work has been most satisfactorily carried out in Dr. Günther's admirable Genera and Species of all known fishes published under the misleading title of "Catalogue of the Fishes in the British Museum," and recently completed by the issue of the eighth volume. The sound philosophical views expressed in his preface to that volume (which, by some strange inversion, bears a signature not his own) can be appreciated by us all, and zoologists are all agreed as to the care with which they have been worked out in the text. Insects are, however, the great stumbling-block of zoologists. The number of described species is estimated by Gerstaecker at above one hundred and sixty thousand, viz.: Coleoptera, ninety thousand; Hymenoptera, twenty-five thousand; Diptera, twenty-four thousand; Lepidoptera, twenty-two to twenty-four thousand. Mr. Bates thinks that, for the Coleoptera at least, this estimate is too high by one-third, but even with that deduction the number would exceed that of plants, and it is probable that the number of as yet undiscovered species in proportion to that of the described ones is far greater in the case of insects than of plants. We can therefore no longer hope for a Genera and Species of insects, the work of a single hand, or indeed guided by a single mind. The great division of labor, however, now prevalent among entomologists may procure it for us in detail, with one drawback only, that the smaller the portion of the great natural class of Arthropoda to which the entomologist confines his attention, the less he will be able to appreciate the significance of distinctive characters, and the more prone he will be to multiply small genera—that is to enhance beyond their due value the races of the lowest grades—to the great inconvenience of the general naturalist who has to make use of the results of his labor.

A Genera Plantarum is still within the capabilities of a single botanist, although he must, of course, trust much to the observations of others, and it therefore cannot be so satisfactory as if he had examined every species himself. The last complete one was Endlicher's, the result of several years' assiduous labor, but now thirty years old. Dr. Hooker and myself commenced a new one, of which the first part was published in 1862, and which might have been brought nearly to a close by this time had we not both of us had so many other works on hand to deter us, although the researches necessary for these other works have proved of great assistance to the Genera. As it is, the part now nearly ready for press carries the work down to the end of the Compositæ, or about half through the Phænogamous plants. In regard to works of a still more general description, the exposition of the families or orders of plants, we have nothing of importance since Lindley's "Vegetable Kingdom," dated 1845, but republished with some additions and corrections in 1853, and Le Maout and Decaisne's "Traité Générale," mentioned in my address of 1868, and of which Mrs. Hooker is now preparing an English translation, under the supervision of Dr. Hooker. Dr. Baillon has also commenced a "Histoire des Plantes," containing a considerable number of useful original observations, and illustrated by excellent woodcuts, but as a general work, one portion is of too popular a character, and in some cases too diffuse to be of much use to science, and the generic character too technical for a popular work without any contrasted synopsis, and its great bulk in proportion to the information conveyed will always be a drawback. I cannot believe that the author can have been a party to the unblushing announcement of the French publisher, that it is to be completed in about eight volumes. If carried out on the plan of the first one, it must extend to four or five times that number. In Zoology, Bronn's most valuable "Klassen und Ordnungen der Thierreichs," continued after his death by Keferstein and others, which I mentioned in my address of 1866, has advanced but slowly. The Amorphozoa, Actinozoa, and Malacozoa, forming the first two volumes, were then completed, and Gerstaecker has since been proceeding with the Arthropoda, commencing with the Crustacea for the third volume, of which only the general matter and the Cirripedia and Copepoda are as yet published, and three or four parts of a sixth volume for birds have been issued by Selenka, treating the anatomical and other matters in great detail. Another general work of merit, although on a smaller scale, has been proceeding as slowly. Of Carus and Gerstaecker's "Handbuch der Zoologie," the second volume, containing the Arthropoda, Malacozoa, and lower animals, had been already published in 1861, and to this was added in 1868 the first half of the Vertebrata for the first volume, with a promise that the remainder should appear in the autumn, but which promise has not yet been fulfilled. Among the other recently published systematic zoological handbooks of which I have memoranda as published in various Continental states, the most important are said to be Harting's, published at Kiel, in the Netherlands, of which up to 1870 only three volumes had appeared, containing the Crustacea, Vermes, Malacozoa, and lower animals; A. E. Holmgren's "Swedish Handbook;" Zoology, of which Mammalia were published in 1865, and Birds in 1868 to 1871; and Claus's "Grundzüge," and Troschel's "Handbook" (7th edition) for University Teaching in Germany.—BENTHAM, Annual Address to Linnean Society, published in *Nature*.

SPONTANEOUS DOUBLE FLOWER OF NYMPHÆA TUBEROSA.—Dr. E. M. Hale of Chicago sends a flower of the Western White Water-Lily, having apparently only the ordinary number of petals, but no stamens and pistil whatever. If cared for it is likely that the root would soon send up flowers with an increased number of petals, like a full double rose. Unfortunately this species lacks the perfume of N. odorata.

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ZOOLOGY.

ORIGIN OF SPECIES.—Professor Hyatt alluded at a late meeting of the Boston Society of Natural History, to the color of the common Unios and Anodons as probably protective, and the well-known case of the Melaniæ of the Western rivers, which are hardly distinguishable to the unpractised eye, and to the peculiar and marked variations of the siluroid fishes of the same region, which